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Manuscript Report No. 87-15

Manitoba Burrowing Owl Survey 1982-84

By Ratcliff, Brian D.

Manitoba
Natural Resources
Wildlife
Biological Services

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Manitoba Burrowing Owl survey 1982-84.

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Manitoba
Department of Natural Resources
Wildlife Branch
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ABSTRACT

This survey was designed to determine the current status and distribution of the Burrowing Owl in Manitoba. The general public was invited to report all owl sightings. To stimulate local interest in the project, 30 contact people throughout the province were asked if they would receive local reports of owls. Thirty-seven newspapers carried a photograph and article on Burrowing Owls and the survey. Over 700 posters were distributed in high schools, post offices, shopping centers and agricultural representative offices with a local contact name and telephone number. A radio interview about the survey and results of each year of the survey and results of each year of the survey was broadcast twice a year.

A major storm on May 19, 1983 caused severe problems for the owls. The owls had already started incubation and many egg clutches failed to hatch. The recruitment of young owls into the already low population declined and the total number of pairs dropped from 76 in 1982 to 35 in 1984.

A total of 263 owls were banded with standard permanent bands plus a colour band. A juvenile owl banded on July 19, 1982 was found dead at San Antonio, Texas on October 19, 1982. This is the first indication of where the Canadian Burrowing Owl population may be wintering.

A lot of time was spent talking to landowners about this owl and how they could help it. One important management aspect for this threatened species is continued public education.

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INTRODUCTION

The Burrowing Owl was officially classified as a threatened species in Canada in 1979 by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). A declining population has been reported over much of the owls' former breeding range, resulting in the threatened status designation (Wedgwood, 1978). The Burrowing Owl also has been on the National Audubon Society's early warning Blue List every year since 1971 when the list was initiated (Tate, 1981).

Little is known about the Canadian Burrowing Owl population. The only studies in Canada have been conducted by Lang and Weseloh (1973) and Wedgwood (1976, 1978). There have been no thorough studies of the Manitoba population which represents the northeastern extent of the Burrowing Owl's range in North America.

A 3-year survey was conducted from May until August, 1982-1984, with funding from the World Wildlife Fund Canada and the Manitoba Department of Natural Resources, to determine the current status and distribution of Burrowing Owls in Manitoba. A banding program was also initiated to delineate the owl's migration routes and wintering grounds.

METHODS

The study area extended from Winnipeg in the east, Swan River to the north and southwest to the Saskatchewan-North Dakota border. Txis area coincides with the Burrowing Owl distribution range from Wedgwood's COSEWIC report and also the range of the Badger and Richardson's Ground Squirrel (Banfield, 1974). The abandoned burrows created by these mammals are used as nest sites by the owls.

Due to the large study area (approximately 80,000 sq. km.) the only viable way to survey for the owls was to seek help from the general public. The initial month of the survey involved setting up an elaborate communication network. The plan was to have local contact people throughout the study area to receive information from their communities. This would stimulate local interest in the project and enable people reporting owls to contact someone they knew. Thirty individuals acted as contact people (Table 1). An article was placed in 37 newspapers (Table 2) describing the owls and survey, plus giving a local contact name and telephone number. A special poster (Fig. 1) was made and 700 copies were distributed throughout the study area in high schools, shopping centers, post offices and community halls. Since farmers visit local Agricultural Representative offices for information, posters were placed in 24 of these premises. Two radio interviews, one to describe and the other to summarize the survey, were recorded each year by the Manitoba Department of Natural Resources Media Services. Six radio stations in the province broadcasted the interviews.

Nest records from the Prairie Nest Records Scheme at the Manitoba Museum of Man and Nature were investigated. All Burrowing Owl nest localities were visited to determine their present status. Of 10 nests reported from 1971 - 1981, only two were active during this survey. All but one of the sites still offered suitable habitat.

Figure 1: BURROWING OWL POSTER.

THE BURROWING OWL

Photo by R.B.Taylor

A DISAPPEARING NATIVE

In 1979, the Burrowing Owl (Ground Owl) was officially classified as a threatened species in Canada by the Committee on the Status of Endangered Wildlife in Canada. Their definition of a threatened species is any indigenous species of fauna or flora that is likely to become endangered in Canada if the factors affecting its vulnerability are not reversed.

The Burrowing Owl population in recent years has been declining but the factors for this decline are unknown. A project has been initiated by the World Wildlife Fund (Canada) and the Manitoba Department of Natural Resources to determine the current status and distribution of Burrowing Owls in Manitoba.

Please support this project by reporting any sightings of owls or active nest burrows.

Send information with name, address and phone number to:

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Manitoba Dept. of Natural Resources
Wildlife Branch, Box 14
1495 St. James Street
Winnipeg, Manitoba
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MANITOBA
DEPARTMENT OF NATURAL RESOURCES

TABLE 1: Names of Local Contacts.

Dave Braddell, Reston
John Chambers, Boissevain
Barry Danard, Killarney
Rod Durham, Holland
Dennis Fast, Kleefeld
Cliff Findlay, Shoal Lake
Ross J. Finlay, Virden
Ken Gardner, Stonewall
Stan Gugin, Minnedosa
John Murray, Lyleton
Raymond O'Conner, Langruth
Bill Poole, Goodlands
C.H. Robinson, Bagot
George A. Ross, Lauder
Peter Sawatzky, Glenboro
Allan Schritt, Altona
Bill Schroeder, Winkler
Norman Short, Rivers
Thor Sigurdson, Emerson
Kathleen Skertchly, Souris
James Spear, Russell
Ken Staple, Cartwright
Albert Van Den Bosch, Manitou
Bill Walley, Dauphin
Clinton Welch, Roland
Duane Whyte, Swan River
Walter Wyatt, Birnie

Manitoba Department of Natural Resources staff at Brandon, Carberry, and Winnipeg.

TABLE 2: Papers That Featured Burrowing Owl Article and Photograph •

Altona Red River Valley Echo
Baldur Gazette
Birtle Eye-Witness
Boissevain Recorder
Brandon Sun
Carberry News-Express
Cartwright Southern Manitoba Review
Dauphin Herald
Deloraine Times and Star
Gilbert Plains Maple Leaf Press
Gladstone Age-Press
Grandview Exponent
Hamiota Echo
Killarney Guide
MacGregor Herald
Manitoba Co-Operator
Manitoba Naturalist Society Bulletin
Manitou Western Canadian
Melita New Era
Minnedosa Tribune
Modern Pembina Times
Neepawa Press
Pilot Mound Sentinel Courier
Portage La Prairie Graphic
Portage Leader
Reston Recorder
Rivers Gazette-Reporter
Rossburn Review
Russell Banner
Shoal Lake Star
Souris Plaindealer
Stonewall Argus-Teulon Times
Swan River Star and Times
Treherne Times
Virden Chronicle
Virden Empire-Advance
Winnipeg Free Press

When a report of a Burrowing Owl was made, I visited the person reporting the owl to verify each sighting. A special effort was made to talk to that person about the owls and to explain why the project was being conducted. Each nest was visited every 2 weeks and observations were made with a 20X spotting scope to minimize stress at the nest site.

Approximately 2 weeks after the young owls had emerged from the burrow they were banded. The young owls were caught by using a box trap that fit into the burrow. There was a one way (out) swinging screen door in the trap which allowed the young to emerge from the burrow through the trap, but they were blocked off when they tried to re-enter the burrow. An electric weld cage was placed over the entire burrow area to prevent the young from running down other burrows. Adults were caught with a size number one Havahart live animal trap. The owls were banded with a U.S. Fish and Wildlife Service band (size 4) on one leg and a colour ring on the other. Adults were colour banded on the right leg, and the young on the left leg. Blue plastic colour bands were used in 1982, orange in 1983, and yellow in 1984. The ring was Rotex tape, 1 cm in width and 5 cm long. It was wrapped onto itself and glued to seal the end. The colour bands will aid in determining the owl's migration routes, the wintering range, and aging of resident breeding owls.

DISCUSSION

Historical records of Burrowing Owls in Manitoba are limited. Atkinson (1898) stated that the Burrowing Owl was becoming numerous in many localities during the 1890's. The distribution of Burrowing Owls in Manitoba as recorded in naturalist A.G. Lawrence's Winnipeg Free Press "Chickadee Notes" column (1922-55) is presented in Figure 1 and Table 3 (Lawrence, 1922-55).

Butts (1973), Howie (1980), Wedgwood (1976) and Zarn (1974) stated that Burrowing Owl populations have declined in many parts of their range throughout North America. Loss of habitat, control of burrowing mammals, secondary poisoning and road kills have all been suggested as factors which contributed to the decline. Landowners I talked to during this survey indicated that the owls were fairly common from 1930-1960 but have declined since then.

Over the past 30 years many pastures which offered suitable Burrowing Owl habitat have been converted to grain crops. The conversion of these pastures not only eliminate owl habitat but destroys the burrows that are required for nest sites. This loss of habitat is a major factor in the species decline, but it should be noted that there are still many pastures with burrows in them that are not being used by owls. A critically low regional Burrowing owl population is probably the reason why these pastures are not being used.

Ground squirrels and Badgers have both been classified as vermin by landowners on the prairies. Programs to eliminate them from pastures results in the loss of burrows which offer potential nest sites. The use of rodenticides to poison ground squirrels can also cause secondary poisoning in Burrowing Owls. Owls and other predators scavenge on these lethal carcasses. Observations during this survey confirm that landowners still use rodenticides to control ground squirrel populations.

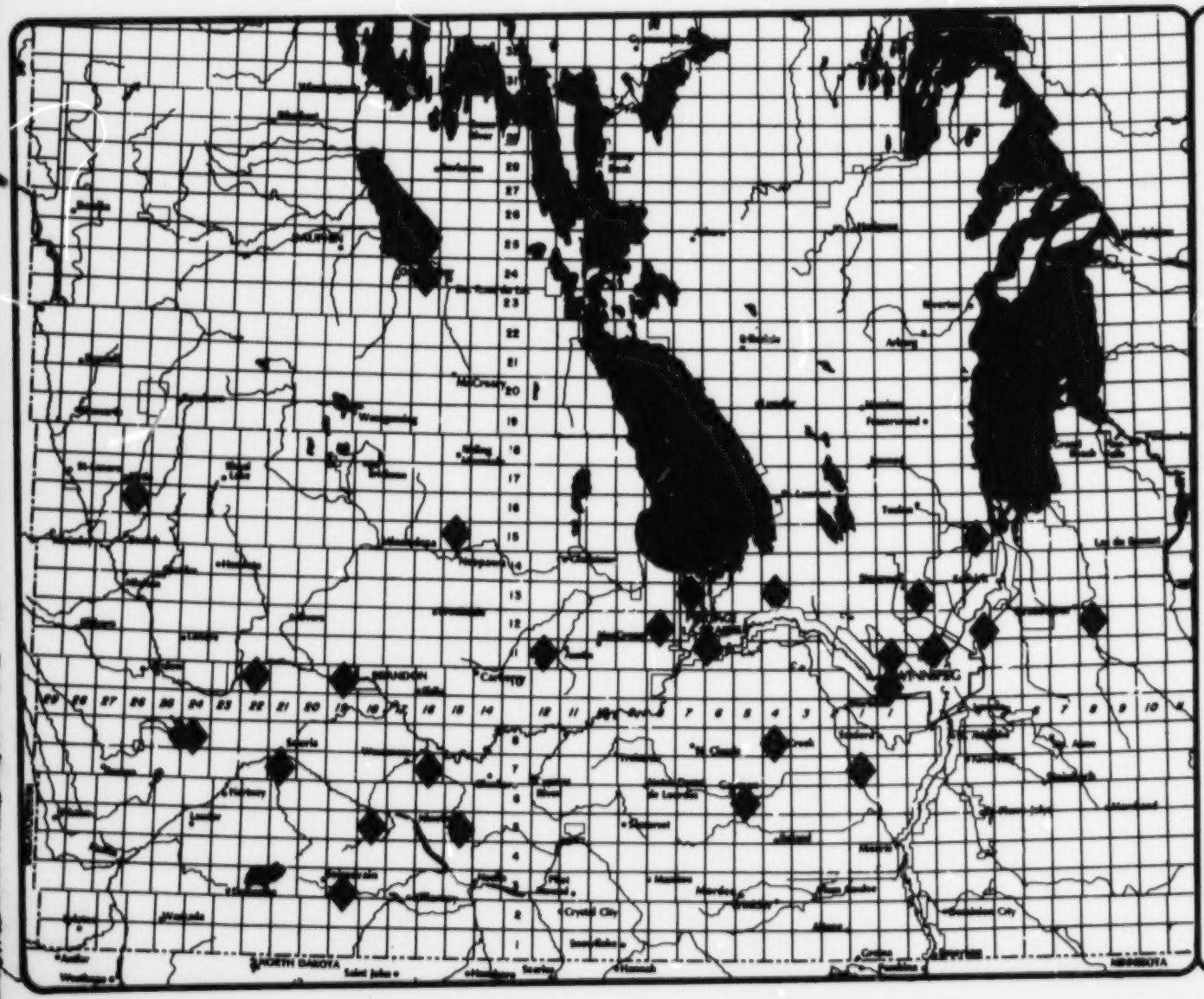

Figure 2.
Historical Records of Burrowing Owls from A. G. Lawrence's Chickadee Notes (1922-55).

Table 3: Burrowing Owl Reports from A.G. Lawrence's "Chickadee Notes" (1922-55).

NOTE #	INFORMATION
18	owls common at Oak Lake, pr. at Popular Pt. 5/7/21.
29	pr. at Austin.
59	one owl at Birtle, 30/4/22. (G.P. Hayter).
168	first report of owl in Man. 1897 at Portage la Prairie.
169	pr. at Rosser, 7/6/24. (C.L. Broley).
171	pr. at Neepawa, (K. Laidler) and pr. at Macdonald, (A.W. McKay) /24.
185	breeding pr. at Headingly.
216	owls breeding at Brookside in 1924.
286	two pr. west of Winnipeg 31/7/26.
292	three owls banded at East Kildonan by J.R. Morton.
298	two owls banded by A.B. Gresham at West Kildonan. 31/7/26.
310	W.D. Black at Margaret reports owls more scarce. 1927.
321	one pr. and six eggs at Deer Lodge. (B.W. Cartwright). 15/5/27.
323	near Brunkild one owl observed. 25/4/27.
423	owl obser. near St. Charles. 21/4/29.
435	owl obser. near Beausejour. 17/7/29. (A.B. Gresham).
496	owl nest at Belmont, three young, 1930 (J.C. Wilson).
735	one owl at Clandeboye. 19/4/35. (J. Baxter).
737	C.L.S. Allward reports owl at Brandon, 1935.
742	nest at Hartney, (Walker)., pr. at Stoney Mountain. (Lawrence) 1935.
841	owl at Boissevain, (A. Dickson)., pr. at Winnipeg, (Shortt) 2/5/37.
845	two pr. nesting at St. James, 29/5/37. (A.H. Shortt).
872	nest at Rosser, nine young, 25/6/37. (T. Walles).
910	one pr., five young at Carmen, five young at Cartwright. 7/8/38.
945	one pr. at Oak Lake and four others near by. 1939.
955	pr. at Dauphin Lake. 10/5/39. (E. Robinson).
994	one owl at Treesbank. 1940. (S. Criddle).
1049	one owl obsder. at St. Charles. (G. Smith). 1941
1052	pr. at Treesbank. 13/5/41. (S. Criddle).
1076	Winnipeg. May/41. one owl obser. (G. Smith).
1154	nest at MacDonald. 10/4/43. (A.J. MacKay).
1157	pr. at Winnipeg. (W. Finnsson), pr. at Dauphin Lake. (Robinson) 1943.
?05	20/4/44. one owl obser. at Delta.
1301	J.L. Morton obser. one owl at Rosser. 19/4/46.
1309	nest at Griswold. 1946. (Louise Griggs).
1410	Owl obser. at Souris. 17/5/48. (G.Willits).
1460	H. Mossop obser. owl at Winnipeg. (10/5/49.
1513	V.B. Latta obser. owl at Winnipeg. 14/5/50.
1527	Information Inquiry by G.H. Hambley from Grandview. 1950.
1563	owl obser. at Winnipeg. 28/4/51. (V.B. Latta).
1576	two pr. nesting at Dikens. 1951. (R. Turbett).
1614	single owl at Elm Creek. 16/4/52. (H. Mossop).

Another possible reason for the Burrowing Owl decline is the use of insecticides to control grasshoppers. In 1984, local municipalities and landowners in southwestern Manitoba introduced spraying programs to control a major infestation of grasshoppers. Spraying programs result in the direct loss of food for the owls and possible death from feeding on contaminated insects. After the young Burrowing Owls have hatched, grasshoppers are their primary food source. There have been no studies to show the effects of secondary poisoning from rodenticides or insecticides on Burrowing Owls. Burrowing Owl deaths due to these chemicals are localized occurrences.

Mortality from road kills is a serious problem. During this survey there were reports of seven owls killed on highways. Most of the dead were young owls which had recently fledged and were scavenging for dead insects on the road after dark. Incidentally, while driving between Boise, Idaho and Pocatello, Idaho in August 1981, I observed 23 Burrowing Owls dead on the road. Most were fresh carcasses from the previous night. It is difficult to assess overall losses due to road kills but it is obvious that they are significant.

A few landowners stated that Burrowing Owl numbers had increased during the late 1970's. The loss of many stock pastures to cultivation has resulted in the birds nesting in farmyard pastures. Farmyard pastures are usually less than 10 hectares and adjoin farm buildings. These pastures are seldom incorporated into larger grain fields. When the owls return each spring, nest site availability is almost guaranteed in these pastures. In 1982, 41 of the 76 pairs were located in this type of pasture. Instead of Burrowing Owls increasing in numbers there has possibly been a population shift to more stable pastures, and the owls present are now more readily observed by the landowner.

When this survey was started in 1982, I had no idea how many Burrowing Owls would be located. When 76 pairs were found that year I was pleased because it was consistent with the 100 pairs that Wedgwood had estimated for Manitoba in his COSEWIC report (Wedgwood, 1978). As Table 4 indicates, the number of pairs located dropped by more than 50

TABLE 4: Burrowing Owl population and reproduction, 1982-83.

	1982	1983	1984
Pairs	76	60	35
Successful breeding pairs	55	30	27
Single adults observed	24	17	7
Young owls observed	204	96	142
Average brood size	3.7	3.2	5.3
Total owls observed	380	233	219
Owls banded	102	60	101

percent during this survey. The major reason for this decline was the weather. On May 12, 1983, a severe storm left up to 20 cm of snow and ice on the ground in western Manitoba. One landowner knocked the ice crust off the burrow entrance after failing to observe the owls for 3 days. With 15 minutes both owls were standing at the burrow entrance. Mid-May is when the owls start their egg laying and incubation. The cold temperatures disrupted embryo development of the eggs and the nest success was only 50 percent in 1983 compared to 72 percent in 1982. The total number of young observed was 53 percent less in 1983 than in 1982. The Burrowing Owl population in Manitoba is low and for the population to remain stable there needs to be adequate recruitment of young owls into the population each year. Results of the low recruitment showed this effect when only 35 pairs of owls were located in 1984. Whether the owls rebound and build their population back up will only be known with future monitoring programs. Figs. 3, 4 and 5 represent the 1982, 1983 and 1984 Burrowing Owl distribution in Manitoba.

The average brood size for the study was 4.1. This number is comparable to 4.6 in Saskatchewan (Wedgwood, 1976), 4.2 in western Minnesota (Grant, 1965), 4.9 in Mexico (Martin, 1973) and 2.2 in California (Thomsen, 1971). The brood size increase from 3.2 in 1983 to 5.3 in 1984 was attributed to a marked increase in grasshoppers as a food source. Grasshopper populations have been increasing during the past few years and this increase in food availability enables more young owls to reach fledging age.

Burrowing Owls return from their wintering grounds during April and by the first week of May have established pair bonds and secured territories. The incubation period is 28-29 days and the young emerge from the burrow approximately 10 days after hatching. The first appearance of young owls was 18 June, with 1 July as the average date. The owls were then observed for 2-3 weeks to determine complete brood size. After brood size was determined, the owls were banded. Ten adults and 253 young owls were colour banded during this survey. A young owl banded near Waskada, Manitoba on 7 July 1982 was found dead on the side of the road near San Antonio, Texas on 15 October 1982.

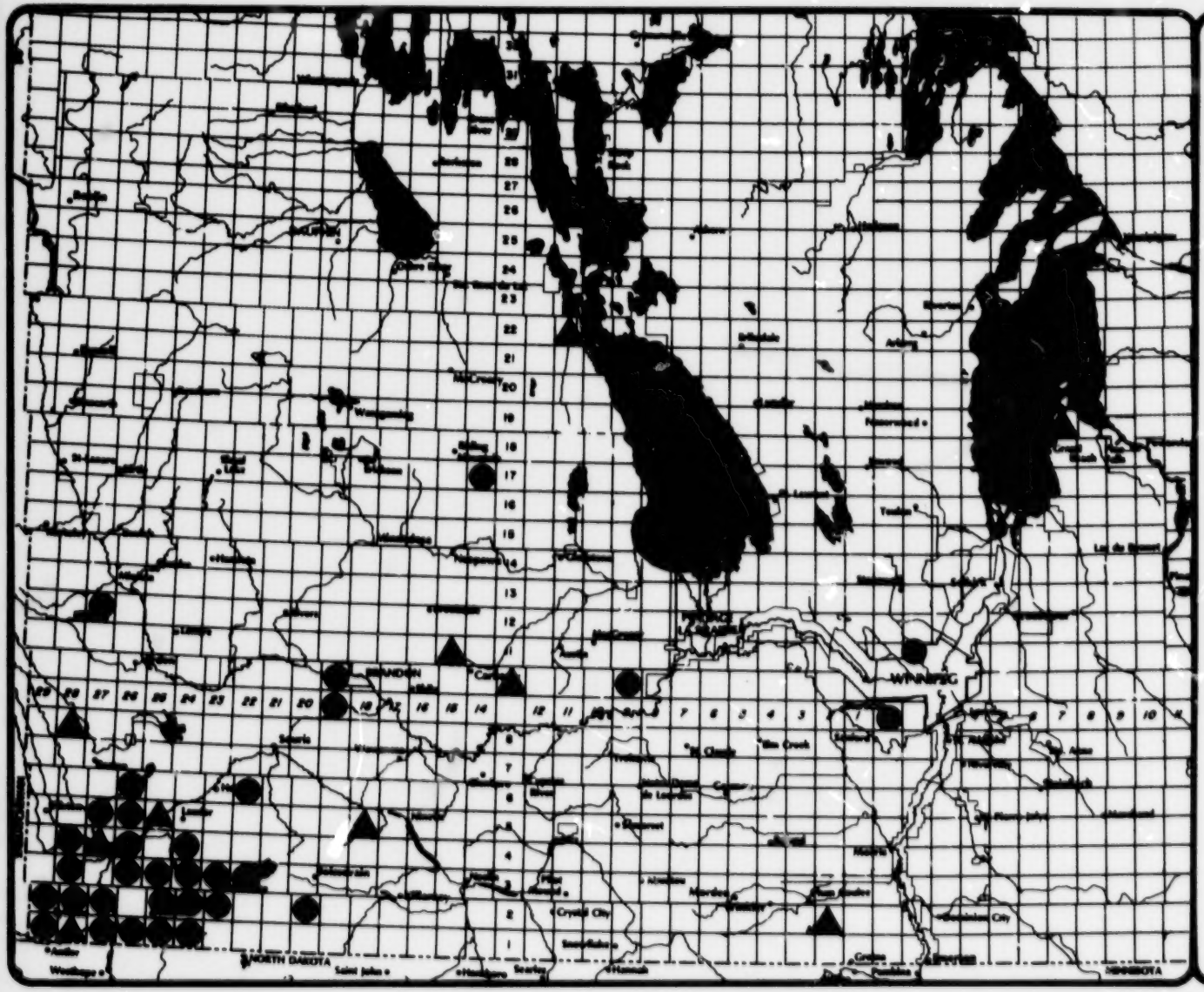

Figure 3.
1982 Burrowing Owl Site Distribution.

● Township with one or more pairs.

▲ Township with sighting of adult owl.

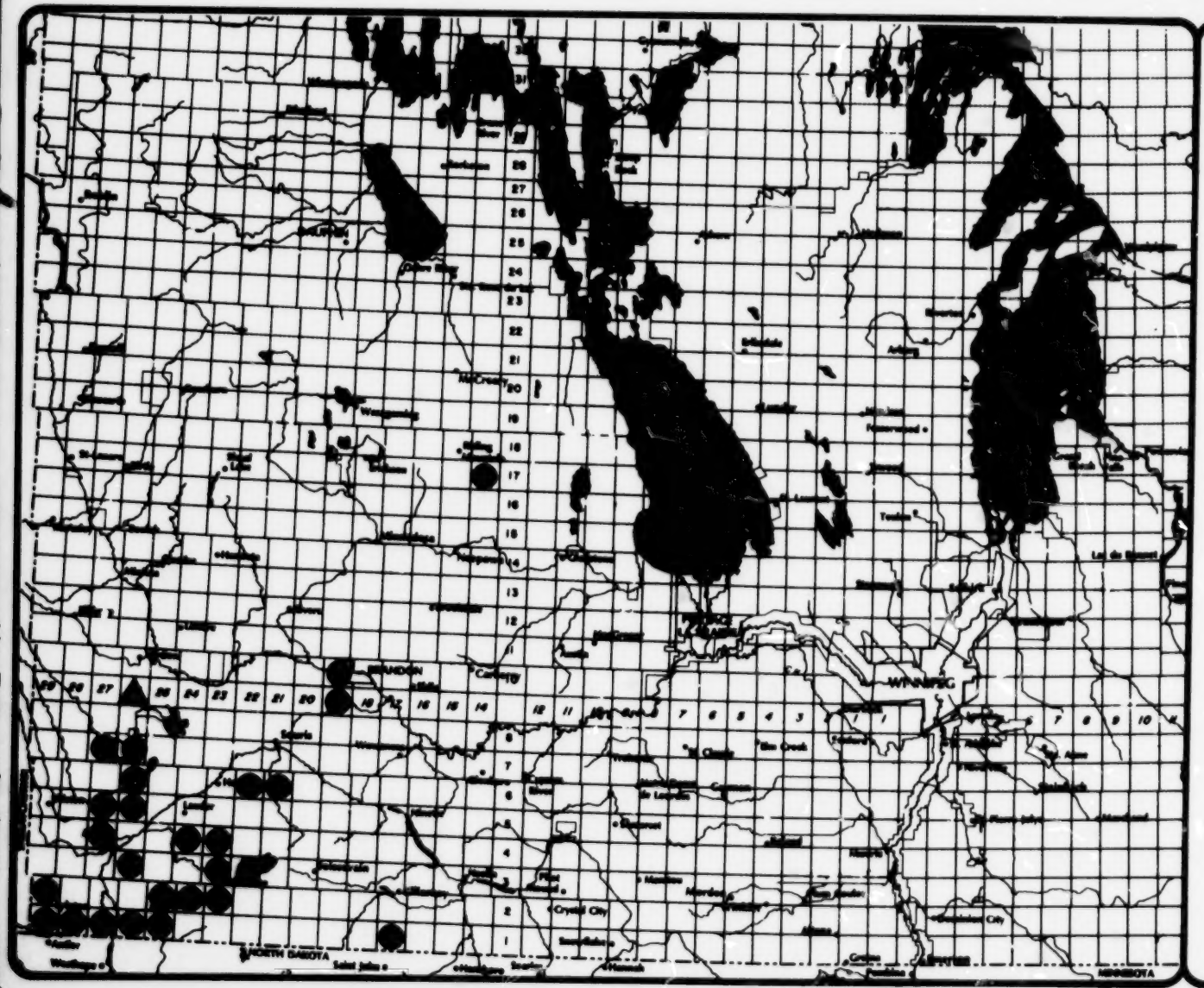

Figure 4.
1983 Burrowing Owl Site Distribution.

● Township with one or more pairs.

▲ Township with sighting of adult owl.

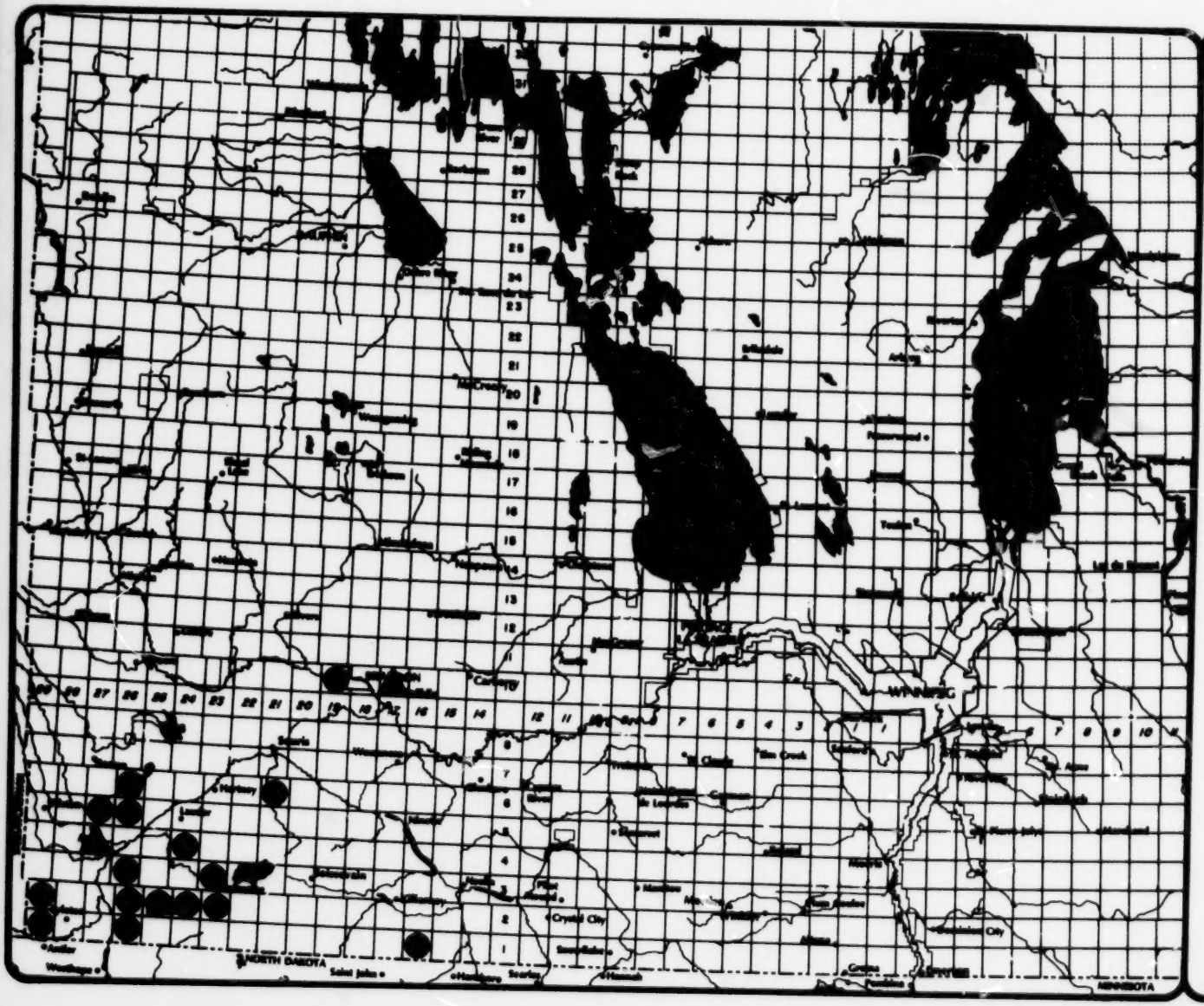

Figure 5.
1984 Burrowing Owl Site Distribution.

● Township with one or more pairs.

▲ Township with sighting of adult owl.

TABLE 5: Results of Burrowing Owl Survey, 1982.

Location of Burrowing Owl Pairs by Section, Township, Range
(Number of pairs in parenthesis)

NW 30-10-8 W
NW 10-17-14 W
NE 15-9-19 W
NE 18-9-19 W
NW 2-10-19 W
NE 16-10-19 W
NE 7-3-22 W
SE 16-6-22 W
NE 18-2-23 W
NE 34-2-23 W
NE 10-3-23 W
NE 6-1-24 W (2)
NE 10-1-24 W
NW 11-1-24 W
SE 26-2-24 W
NW 8-3-24 W
NW 36-3-24 W
SE 2-4-24 W (3)
SE 21-4-24 W (3)
NE 29-4-24 W
NE 6-1-25 W
SW 9-1-25 W (3)
SE 6-2-25 W
SW 16-2-25 W (3)
SW 18-2-25 W (2)
NE 24-3-25 W (2)
NE 29-1-26 W
NW 15-3-26 W
SE 26-3-26 W
SW 2-4-26 W
SE 31-4-26 W
SW 5-6-26 W
NE 16-6-26 W
NW 20-6-26 W
NW 31-6-26 W (5)
NW 16-1-27 W (2)
NE 32-2-27 W
NW 9-5-27 W (3)
SW 29-12-27 W
NW 32-2-28 W
SE 5-3-28 W
SE 6-3-28 W
SE 14-4-28 W (2)
SE 22-1-29 W
NW 24-2-29 W
SW 13-2-29 W (3)
NW 23-2-29 W
SW 36-2-29 W (2)
One pair near Boissevain
Two pair near Springstein
One pair near Winnipeg

Single Adult Burrowing Owl Sightings
(Multiple sightings in parenthesis)

SW 11-19-7 E
SE 3-2-2 W
SW 13-26-10 W
SE 25-22-11 W
NE 29-10-13 W
SE 18-11-15 W
SW 23-5-18 W
NW 2-10-19 W
SE 8-10-19 W
NW 10-10-19 W
SE 10-2-24 W
NW 5-3-24 W
SW 6-5-25 W
NW 15-3-26 W (2)
NE 16-6-26 W
NW 31-6-26 W
NW 35-4-27 W
NW 12-1-28 W
SW 19-1-28 W
SW 5-3-28 W
SW 15-3-28 W
SW 6-8-28 W
SE 27-2-29 W

TABLE 6: Results of Burrowing Owl Survey, 1983.

Location of Burrowing Owl Pairs by Section, Township, Range
(Number of pairs in parenthesis)

NW 10-17-14 W
NW 15-1-16 W
NE 35-9-19 W
NE 16-10-19 W
NE 8-6-21 W
SE 16-6-22 W
NE 28-2-23 W
NE 34-2-23 W (2)
NW 35-2-23 W
NE 1-3-23 W
NE 10-3-23 W
SW 12-3-23 W
NE 18-4-23 W
NW 19-4-23 W
NE 6-2-24 W
NE 26-2-24 W
SE 2-4-24 W (3)
SE 21-4-24 W (3)
NE 29-4-24 W (2)
SW 9-1-25 W (4)
SW 16-2-25 W (3)
SE 28-2-25 W
NE 29-1-26 W
NW 15-3-26 W
NE 28-3-26 W
NW 8-5-26 W
SW 15-6-26 W
NW 31-6-26 W (2)
NW 32-6-26 W
NE 19-7-26 W
NW 19-7-26 W
NW 16-1-27 W (2)
NE 27-4-27 W (2)
NW 9-5-27 W (3)
NE 24-7-27 W
SW 19-1-28 W
NE 2-1-29 W
SW 17-1-29 W
SW 21-1-29 W
NW 24-1-29 W
SW 13-2-29 W (2)
NW 23-2-29 W (2)

Single Adult Burrowing Owl Sightings
(Multiple sightings in parenthesis)

NW 16-9-19 W
SW 2-10-19 W
SW 7-3-22 W
NW 19-4-23 W
SW 10-2-24 W
NE 23-2-24 W
SW 18-2-25 W
SE 28-2-25 W
NE 28-3-26 W (2)
SW 1-9-26 W
NE 27-4-27 W
SE 25-1-29 W
SW 18-2-29 W
NW 23-2-29 W
SE 35-2-29 W

TABLE 7: Results of Manitoba Burrowing Owl Survey, 1984.

Location of Burrowing Owl Pairs by Section, Township, Range
(Number of pairs in parenthesis)

NW 15-1-16
NW 16-10-19
NW 8-6-21
SE 19-2-23
NE 28-2-23
NW 35-2-23
NE 1-3-23
SD 12-3-23
NE 26-2-24
SE 2-4-24 (2)
SE 21-4-24 (2)
NE 29-4-24 (2)
SW 16-2-25
SE 28-2-25
NE 29-1-26
SE 22-2-26 (2)
NW 15-3-26
NW 8-5-26
SW 15-6-26
NW 9-5-27
NE 11-1-29
SW 17-1-29
SE 25-1-29
NE 26-1-29
SE 13-2-29 (2)
NW 23-2-29 (2)

Single Adult Burrowing Owl Sightings

NW 4-10-17 (3)
NE 35-9-1
NE 31-2-26
NE 27-4-27
NE 2-1-29

The owl was decomposed and the person who found the owl estimated it had been dead for about a week. The distance between the two locations is approximately 2,200 km. The landowner in whose pasture this owl was raised informed me that there were still owls in the pasture during the first week of September. From these dates it is assumed that the owl took 4-6 weeks to fly from Manitoba to Texas. This is only the second band return and gives some indication of the owl's migration route and wintering grounds. The other band return was from an owl banded by A.B. Gresham at West Kildonan, Manitoba on 31 July 1926 and shot at Spalding, Nebraska on 24 September 1927 (National Parks Canada, 1928), Fig. 6. It is my opinion that Burrowing Owls that breed in Manitoba winter in Mexico.

The Manitoba Burrowing Owl Survey was the first in depth attempt to document the status and distribution of the owl in the province. There is now better understanding of the owl's provincial status.

This survey was public-oriented, designed to draw attention to the problems this bird is encountering. Since all of the nests were found on private lands, protection of the owls must involve landowners. The positive response showed by landowners to this survey and to the owls suggests that this approach is probably the best management plan for the owls at the present time.

FIGURE 6.

FOREIGN RECOVERIES OF
MANITOBA BANDED
BURROWING OWLS

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LITERATURE CITED

ATKINSON, G.E. 1898. Manitoba birds of prey and small mammals destroyed by them. Historical and Scientific Soc. Manitoba, Trans. 53.

BANFIELD, A.W.F. 1974. The mammals of Canada. Univ. Toronto Press, Toronto, Ontario. 438 pp.

BUTTS, K.O. 1973. Life history and habitat requirements of Burrowing Owls in western Oklahoma. M. Sc. Thesis, Oklahoma State Univ., Stillwater, Okla. 188 pp.

GRANT, R.A. 1965. The Burrowing Owl in Minnesota. Loon 37 : 2-17.

HOWIE, R. 1980. The Burrowing Owl in British Columbia, In Threatened species and habitats in British Columbia and the Yukon (R. Stace-Smith, Ed.). P. 88-95. British Columbia Ministry of Environment, Victoria, B.C. 302 pp.

LANG, V. and D.V. WESELOH. 1973. Burrowing Owl inquiry. Calgary Field Nat. 4 : 197.

LAWRENCE, A.G. 1921-1955. "Chickadee Notes". Winnipeg Free Press. 1756 columns.

MARTIN, D.J. 1973. Selected aspects of Burrowing Owl ecology and behavior. Condor 75 : 446-456.

NATIONAL PARKS OF CANADA. 1928. Official Canadian record of bird banding returns. Can. Field-Nat. 42 : 156.

TATE, J. 1981. The Decade List and the 1981 Blue List. Am. Birds. 35 : 3-10.

THOMSEN, L. 1971. Behavior and ecology of Burrowing Owls on the Oakland Municipal Airport. Condor 73 : 177-192.

WEDGWOOD, J.A. 1976. Burrowing Owls in south-central Saskatchewan. Blue Jay 34 : 26-44.

WEDGWOOD, J.A. 1978. The status of the Burrowing Owl in Canada. A report prepared for the Committee on the Status of Endangered Wildlife in Canada. Can. Wildl. Serv. 84 pp.

ZARN, M. 1974. Burrowing Owls. U.S. Dept. Inter., Bur. Land manage. Tech. Note T-N-250, Denver, Colo. 25 pp.